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Proceedings of The Canadian Phytopathological Society

Twenty-seventh Session

JUNE 26-29, 1961

REGINA COLLEGE
REGINA, SASKATCHEWAN

DEC - 5 1961

Editorial Committee
R. V. CLARK (CHAIRMAN)
J. A. PARMELEE
J. G. SHAW
V. R. WALLEN

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The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL
1960-61

President

W. E. SACKSTON, Prof. Plant Pathology, Macdonald College, Quebec.

Vice-President

R. S. WILLISON, Plant Pathology Laboratory, St. Catharines, Ontario.

Secretary-Treasurer

V. R. WALLEN, Plant Research Institute, Research Branch, Canada Agriculture Ottawa.

Councillors

M. W. CORMACK, Research Laboratory, Canada Agriculture, Saskatoon, Sask.
A. N. LANGFORD, Bishops College, Lennoxville, Quebec.

Copies of the Proceedings of the Canadian Phytopathological Society may be obtained from the Secretary-Treasurer, Dr. V. R. Wallen, Plant Research Institute, Research Branch, Canada Agriculture, Ottawa, Ontario.

The price of single copies is 50c.

ANNUAL MEETING, JUNE 26-29, 1961
C.P.S. Regina College, Regina, Saskatchewan

Row 1: S. S. Husain, R. Robinson, C. G. Riley, J. E. Bier, J. B. Lebeau, N. Sharon.
Row 2: R. J. Ledingham, M. J. Kuo, M. W. Cormack, B. W. Dance, P. J. Salisbury, R. D. Whitney, R. S. Willison, R. H. Estey, V. R. Wallen, A. W. Henry, C. J. Hickman, R. G. Ross.
Row 3: R. D. Tinline, M. Timonin, J. Reid, P. M. Simmonds, L. W. Koch, E. J. Hawn, W. P. Campbell, G. J. Green, J. T. Slykhuis, R. W. Cromarty, W. J. Cherewick.
Row 4: W. C. MacDonald, W. L. Seaman, R. E. Fitzpatrick, T. C. Vanterpool, R. N. Wensley, N. Colotelo, C. M. Christensen, J. M. Wilks, M. J. Pratt.
Row 5: R. C. Russell, H. Zalasky, W.A.F. Hagborg, B. J. Sallans, T. H. Smith, J. F. Bradbury, E. W. B. Ward, L. Piening, D. W. Creelman.

In Memoriam

RICHARD RANKIN HURST (1895 - 1961)

A Maritimer, and one who began a career early in the history of Canadian plant pathology, Dick Hurst became a plant disease investigator in 1918 at Charlottetown, P.E.I., when the facilities there included the horse and wagon.

As Officer-in-charge of the Laboratory of Plant Pathology at Charlottetown (1927-59), his personal attentions were directed to the diseases of potato; with the reorganization of the Canada Department of Agriculture in 1959, he took on the administrative duties of the newly formed Research Laboratory.

R. R. Hurst held membership in the Professional Institute of the Public Service of Canada, was a charter member of the Agricultural Institute of Canada, and was a charter member and past president of the Canadian Phytopathological Society.

We join his family in remembrance.

MINUTES OF THE TWENTY-SEVENTH MEETING
HELD AT REGINA COLLEGE
REGINA, SASKATCHEWAN
JUNE 26-29, 1961

Business Sessions: June 26 and June 28.

Dr. R. S. Willison opened the sessions with an address of welcome to members and visitors.

The minutes of the twenty-sixth meeting were adopted on a motion by W. J. Cherewick seconded by R. G. Ross. Carried.

The report of the Secretary-Treasurer was adopted on a motion by V. R. Wallen seconded by W. A. F. Hagborg. Carried.

The report of the Editorial Committee was adopted on a motion by V. R. Wallen seconded by D. W. Creelman. Carried.

The report of the Nominating Committee was adopted on a motion by M. W. Cormack seconded by R. E. Fitzpatrick. Carried.

The report of the Program and Publicity Committee was adopted on a motion by R. J. Ledingham seconded by W. P. Campbell. Carried.

The report of the Resolution Committee was read by R. G. Ross. The resolutions (Nos. 1-4) were adopted on motion by R. G. Ross seconded by A. W. Henry. After considerable discussion additional resolutions were brought forth:

It was moved by W. J. Cherewick seconded by R. H. Estey that the executive of the Canadian Phytopathological Society endeavour to arrange our annual meeting with other societies from time to time instead of with the A.I.C. Carried. An amendment requesting the Canadian Phytopathological Society to meet with the Canadian Society of Microbiologists in 1963 was defeated.

It was moved by W. A. F. Hagborg seconded by D. W. Creelman that the executive be empowered to appoint a committee to find out the possibilities of publishing a Canadian Journal of Plant Pathology. After investigating the various possibilities the committee would submit their findings to the membership at large for its decision. Carried.

It was moved by A. W. Henry seconded by C. J. Hickman that the Secretary should write a letter of condolence to bereaved families of members. Carried.

The members of the Nominating and Resolutions Committees were appointed by the executive and named from the chair.

It was proposed by M. W. Cormack seconded by R. E. Fitzpatrick and unanimously approved that the following be elected Honorary Members of the Society: J. F. Hockey, B. Peturson and H. N. Racicot.

The following applications for membership in the Society were approved unanimously on motion by W. A. F. Hagborg seconded by W. P. Campbell: W. L. Seaman, R. W. Cromarty, C. J. Hickman, J. F. Bradbury, D. A. Chant, H. S. Pepin, J. E. Moffatt, R. P. Strogryn, T. G. Atkinson, B. C. R. Williams, M. Waseem, M. A. Viswanathan, L. Tartier, P. M. K. Tadjalli, H. S. Olthof, T. Limonard, M. O. Garraway, G. Thomas, C. Gagnon, D. J. S. Barr, S. S. Husain.

It was moved by R. G. Ross seconded by A. W. Henry that honoraria for stenographic assistance be provided.

The executive and membership at large on motion by W. J. Cherewick seconded by R. J. Ledingham appointed the following members as the committee to investigate the possibilities of producing a Canadian Journal of Plant Pathology: W. A. F. Hagborg (Chairman), D. W. Creelman, A. J. Skolko, and W. P. Skoropad.

The meeting adjourned following a motion of appreciation by T. C. Vanterpool seconded by W. J. Cherewick to Dr. R. S. Willison for carrying on so capably in the absence of the President.

COMMITTEES

Auditors: Mildred K. Nobles and J. W. Groves.

Editorial: R. V. Clark (Chairman), J. A. Parmelee, J. G. Shaw, V. R. Wallen.

Nominating: W. E. Sackston (Chairman), M. W. Cormack, R. G. Ross, J. E. Bier, J. T. Slykhuis.

Program and Publicity: M. D. Sutton (Chairman), W. L. Seaman, V. R. Wallen.

Resolutions: W. J. Cherewick (Chairman), K. A. Harrison, R. E. Fitzpatrick, W. P. Skoropad.

Terminology: M. R. Welsh (Chairman), W. A. F. Hagborg, B. H. MacNeill, H. M. Good, T. C. Vanterpool, R. S. Willison, R. A. Ludwig, W. E. McKeen, C. D. McKeen, D. J. MacLeod, R. Pomerleau, L. E. Tyner, A. W. Henry, A. N. Langford.

Regional Representatives:

Maritimes	J. Munro
Eastern Quebec	D. Leblond
Western Quebec	F. Godbout
Eastern Ontario	W. L. Seaman
Western Ontario	B. H. MacNeill
Manitoba	W. J. Cherewick
Saskatchewan	R. D. Tinline
Alberta	R. Robinson
B.C. Mainland	R. Stace-Smith
Vancouver Island	R. E. Foster

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members:

As Secretary-Treasurer for the year ending May 31, 1961, I respectively submit the following report.

The twenty-sixth session of the Society was held at the Ontario Agricultural College, Guelph, Ontario, June 20-23, 1960 and the Proceedings were reported in Number 27 of the society's publication issued December 5, 1960.

Membership in the Society totals 224 and 21 applications for membership are not included in this total.

The Society pays tribute to the passing of one member since our meeting last year, Mr. R. R. Hurst of the Charlottetown laboratory, who died shortly after his retirement.

Our financial statement for the year ending shows a favourable balance of $817.78. It should be noted that expenditures this year exceeded revenue by 46.54. This defecit can be attributed almost in total to the publication of the Proceedings which were larger than in other years.

Respectfully submitted,

V. R. Wallen,

Secretary-Treasurer.

FINANCIAL STATEMENT

CANADIAN PHYTOPATHOLOGICAL SOCIETY

June 1, 1960 to May 31, 1961

Revenue :

Balance brought forward May 31, 1960		$ 864.32
By fees	$427.78	
Bond interest	15.00	
By sale of Proceedings	7.19	
Total receipts		449.97
		$1,314.29

Expenditures :

Honoraria — Stenographic assistance (59-60)	15.00	
Postage	50.00	
Supplies	42.08	
Refund of fees	.93	
Printing of Proceedings No. 27	388.50	
		496.51
Bank balance May 31, 1961		$ 817.78

Additional Assets :

Dominion of Canada Bond (Series P7Z 95546)	$ 500.00

Audited and found correct,

(signed) Mildred K. Nobles

J. Walton Groves

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings of the twenty-sixth session of the Canadian Phytopathological Society were issued on December 5, 1960. It contains the reports of the Annual Meeting held at the Ontario Agricultural College, Guelph, Ontario, June 20-23, 1960 and Abstracts of 17 papers that were presented. Summaries of the panel discussion "Plant Pathology in Canada-Today" and the paper by D. L. Bailey given at the Ninth International Congress, Montreal, in 1959 on "The Organization and Development of Plant Pathology in Canada" are included. It also contains a list of titles of 128 papers published by members of the Society during the period June 1, 1958 to May 31, 1960.

This issue of the Proceedings is somewhat larger than recent numbers since no meeting was held in 1959 and because the summaries of the panel discussion and paper by Dr. Bailey were included. However, the executive felt that the latter were of great interest to the general membership and should be published in the Proceedings. Only titles of published papers actually sent in by members before the September 30 deadline were included in the Proceedings. The membership at large could assist the editorial committee by careful preparation of abstracts of papers they are presenting and lists of papers they submit, following the form of previous Proceedings. Their prompt submission would also be appreciated and would enable an earlier date of publication.

Respectfully submitted,

J. A. Parmelee
J. G. Shaw
V. R. Wallen
R. V. Clark (Chairman)

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee of the Canadian Phytopathological Society is pleased to present the following nominations for the year 1961-62 :

President :	R. S. Willison
Vice-President :	L. E. Tyner
Secretary-Treasurer :	V. R. Wallen
Councillors :	W. E. Sackston
	N. S. Wright

Respectfully submitted,

R. H. Estey
R. A. Ludwig
A. J. Skolko
M. F. Welsh
M. W. Cormack (Chairman).

REPORT OF PROGRAM AND PUBLICITY

The committee members looking after arrangements for the 1961 C.P.S. meetings at Regina, Saskatchewan, were V. R. Wallen, R. D. Whitney and R. J. Ledingham (Chairman). We were at some disadvantage having no member resident in Regina. However, we are grateful to the Program Committee of the Regina Branch of the A.I.C. for attending to our classroom needs, projectors and so forth.

Our society president, Dr. W. E. Sackston, was fortunate in securing as guest speaker, Dr. C. M. Christensen, Plant Pathology Department, Institute of Agriculture, University of Minnesota, St. Paul, for our annual dinner, being held at the Bell City Motel (South Highway Restaurants Ltd.) on Tuesday, June 27.

As in recent years the Agricultural Pesticide Technical Society members met with us for a half-day. Owing to a heavier than usual program of contributed papers no special arrangements were made for the joint session other than to schedule for the period in question the papers of most interest to the two groups.

REPORT OF THE RESOLUTIONS COMMITTEE

1. Whereas the Canadian Phytopathological Society held its 27th session at Regina, Saskatchewan, June 26-29, 1961, in conjunction with the annual meeting and convention of the Agricultural Institute of Canada and whereas the accommodations and facilities placed at the disposal of the Society have contributed notably to the success of the session :

Be it resolved that we extend our sincere appreciation to :

a) Our hosts the Regina Branch of the Agricultural Institute of Canada for their hospitality.

b) Dr. W. A. Riddell, Dean, Regina College, for the excellent facilities provided on the campus.

c) Mr. R. J. Ledingham and committee for their arrangements for the program and banquet.

d) Dr. C. M. Christensen, University of Minnesota for his address to the Society and after dinner speech at the banquet.

2. It is resolved that the Society extend its best wishes to the following member on the occasion of his retirement :

Dr. J. F. Hockey

3. Be it resolved that the Society pay tribute to former members who have died since our last meeting, R. R. Hurst and Dr. H. T. Gussow.

4. There are indications that the present shortage of trained plant pathologists will increase during the next few years because of the number due to retire (12 in next 5 years) from the Federal Civil Service. The essential role of suitable summer employment for undergraduates in acquainting them with this field is well known.

Therefore be it resolved that the Society take steps to acquaint the proper authorities with the situation and recommend that increased summer employment be made available in the field at all Research Stations and Institutes engaged in plant pathological research with a view of evaluating and subsequently encouraging promising students to enter this field.

All resolutions were passed unanimously.

K. A. Harrison
W. E. Sackston (Chairman)

ABSTRACTS OF PAPERS PRESENTED AT THE TWENTY-SEVENTH MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

BARK TURGOR LEVEL AS AN INDEX OF TREE VIGOR AND VULNERABILITY TO CANKER DISEASES

John E. Bier, University of British Columbia, Vancouver

Field and laboratory experiments on several canker diseases including those caused by *Hypoxylon pruinatum* (Klotsche) Cke. and *Septoria musiva* Pk. have shown a close correlation between the relative turgidity level of the tree bark and its susceptibility to disease. Canker growth occurred only when the relative turgidity of the bark was below 80%. Season of the year, site conditions, and suppression were demonstrated to be factors which resulted in a reduction of the relative turgidity to levels below the inhibiting value of 80%. In cuttings of *Populus* sp. correlations were found to exist between the degree of vigor as expressed by the production of basal callus and the associated wound roots and the relative turgidity of the bark at the time of harvest or planting. The ability to produce basal callus and wound roots decreased in cuttings with relative turgidities below the 80% level, and many were killed by the development of basal cankers. The possibility of employing similar methods of investigation for the discovery and evaluation of canker diseases of importance in disease-testing programs will be discussed.

STORAGE OF TREATED, MOIST GRAIN

W. P. Campbell, Plant Pathology Laboratory, Canada Department of Agriculture, Edmonton, Alberta.

Samples of wheat, oats and barley with water contents of 13.1%, 14.5%, 16.0% and 18.0% were treated with Mema (methoxyethyl mercury acetate) and Panogen 15 (methyl mercury dicyandiamide). This material was stored in glass jars and samples removed every two weeks for germination tests in pots of soil in the greenhouse. At moisture levels of 16 and 18% all treatments and checks were found to suffer damage. The Mema treated material and the check were about equal and more severely damaged than the Panogen treated material. Wheat seems more susceptible than oats or barley. About the time that germination began to decline *Aspergillus* and *Penicillium* species became macroscopically visible. These data suggest a failure of the chemicals to protect seed from storage rots rather than being directly phytotoxic.

SEASONAL CHANGES IN THE SPORE POPULATION OF *HELMINTHOSPORIUM SATIVUM* IN CROPPED AND FALLOW FIELDS

S. H. F. Chinn and R. J. Ledingham, Research Station, Canada Department of Agriculture, Saskatoon.

The seasonal changes in the spore population of *Helminthosporium sativum* in 24 cropped and 21 stubble fields were determined at intervals starting from early May, 1960 and extending for more than one year. Data obtained to date indicate that in the cropped fields spore population declined slightly from the initial determination till about the latter part of July or early August when increases, some very significant, occured. Both increases and decreases in spore number were noted in the stubble fields that were fallowed in 1960. Some reasons were suggested for these changes.

MOLDS AND MOISTURE CONTENT

Clyde M. Christensen, Department of Plant Pathology, University of Minnesota, St. Paul, Minnesota.

Moisture content of stored grains and many other materials is a major factor in determining which fungi will colonize these materials and the extent to which the fungi will grow once they are established. Some of these fungi have a very sharp lower limit of moisture content for growth, and can detect and take advantage of smaller differences in moisture content than we ordinarily can measure in grains. Fungi in the *Aspergillus restrictus* series of the *A. glaucus* group invade materials whose moisture content is in equilibrium with a relative humidity of 70 - 75%. These fungi are exceedingly common and widespread, and cause various sorts of damage, such as spotting of coated or painted walls in dwellings, inversion of stored sugar, molding of furniture stuffing, including foam rubber, germ damage in wheat and corn intended for milling, and decrease in germination in many kinds of seeds. Media such as PDA or malt agar, low in osmotic concentration, may be lethal to these fungi. Special techniques, usually involving culturing on media of high osmotic pressure, are required to detect them, even when the fungi are present in abundance.

EFFECTS OF MEDIA ON GROWTH OF *KABATIELLA CAULIVORA* (KIRCH.) KARAK

N. Colotelo and A. H. H. Grinchenko, Plant Pathology Laboratory Canada Department of Agriculture, Edmonton, Alberta.

Kabatiella caulivora (kirch.) Karak the casual organism of northern anthracnose of clovers, was grown on various organic and inorganic media. Morphological and cytological changes occurred. Results indicate that cultural variations may be greatly influenced by nutritional factors.

A METHOD OF PROVIDING A STERILE ENVIRONMENT FOR THE GROWTH OF PLANTS FROM SEED TO MATURITY

R. H. Estey and T. H. Smith, Macdonald College, Quebec.

A dual apparatus for the provision of a sterile environment for the growth of plants from seed to maturity is described. The apparatus, consisting essentially of two interconnected glass-enclosed cabinets with gloved inlet ports and filters for air and water, provides a means of conducting a variety of experiments, with potted plants, involving the introduction of one or more microorganisms into otherwise aseptic environments. One half of the twin unit may be used for comparative tests or for control purposes as desired.

A METHOD FOR THE MICROSCOPIC EXAMINATION OF UNDISTURBED LIVING ROOTS

R. H. Estey, Macdonald College, Quebec.

A container in which plants may be grown in soil and placed on the stage of a compound microscope is described. Some roots of plants grown in this unit will grow under a coverglass, in a thin layer of soil or a film of water, where they may be examined microscopically in an undisturbed condition.

SEX AND MATING TYPES IN RELATION TO THE PRODUCTION OF PERITHECIA BY CERTAIN SPECIES OF *FUSARIUM*

W. L. Gordon, Research Station, Canada Department of Agriculture, Winnipeg, Manitoba.

Since 1947, a total of 13 species, varieties, and forms of *Fusarium* classified in 7 sections of the genus, have been induced to form fertile perithecia on sterile media when kept under appropriate environmental conditions in the laboratory.

Four species, namely *F. decemcellulare* Brick *(Calonectria rigidiuscula* (Berk. & Brme.) Sacc.), section Spicarioides; *F. nivale* (Fr.) Ces. *(Calonectria nivalis* Schaffnit), section Arachnites; *F. graminearum* Schwabe *(Gibberella zeae* (Schw.) Petch), section Discolor; and some isolates of *F. solani* (Mart.) App. & Wr. emend S. & H., (*Hypomyces solani* Rke. & Berth. emend. S. & H.), section Martiella, were found to be bisexual (hermaphroditic) and self-fertile. In these species, fertile perithecia are produced on a thallus developed from a single ascospore or from a single conidium.

The remainder of the species investigated, which constitute the larger group, were found to be bisexual (hermaphroditic) and self-sterile. These species are *F. acuminatum* (Ell. & Everh.) Wr. (*Gibberella acuminata* Wr.), section Gibbosum; *F. heterosporum* Nees emend. Raillo (*Gibberella cyanea* (Sollm.) Wr.), *F. sambucinum* Fuckel var. *coeruleum* Wr. (*G. pulicaris* (Fr.) Sacc. var. minor Wr.), *F. sambucinum* Fuckel form 6 Wr. (*G. cyanogena* (Desm.) Sacc.), section Discolor; *F. lateritium* Nees *(G. baccata* (Wallr.) Sacc.), *F. stilboides* Wr. *(G. stilboides* n. sp.), *F. xylarioides* Stey. (*G. xylarioides* Heim & Saccas), section Lateritium; *F. moniliforme* Sheld. (*G. fujikuroi* (Saw.) Wr.), *F. moniliforme* Sheld. var. *subglutinans* Wr. & Rg. (*G. fujikuroi* (Saw.) Wr. var. *subglutinans* Edwards), section Liseola; *F. solani* (Mart.) App. & Wr. emend. S. & H. (*Hypomyces solani* Rke. & Berth. emend. S. & H.), section Martiella.

In these bisexual (hermaphroditic) and self-sterile species, fertile perithecia develop in culture only when two isolates of opposite mating type, are brought together under appropriate conditions. The production of fertile perithecia by some species may be controlled by more than a single pair of mating type genes. Sex and mating type genes are usually inherited independently, in a 1:1:1:1 ratio (25% ♂ mt^A, 25% ♂ mt^a, 25% ♂ mt^A, 25% ♂ mt^a) in crosses between hermaphroditic, self sterile strains and unisexual, mutant male strains. In a cross, however, between a hermaphroditic, self-sterile × unisexual male strain of *F. heterosporum (G. cyanea),* independent segregation of the sex and mating type genes did not occur.

THE SIGNIFICANCE OF COLORLESS PYCNIA AND AECIA PRODUCED BY WHEAT STEM RUST, *PUCCINIA GRAMINIS* PERS. F. SP. *TRITICI* ERIKSS. AND HENN.

G. J. Green, Research Station, Canada Department of Agriculture, Winnipeg, Manitoba.

Barberry plants inoculated with sporidia from six collections of teliospores of *Puccinia graminis* Pers. collected near Winnipeg, Manitoba, since 1953, showed normal orange and white pycnial infections. Inter-mixing the nectar of the white infections resulted in the production of white aecia. Seven grey-brown uredial cultures were obtained by inoculating wheat seedlings with the white aeciospores of *P. graminis* f. sp. *tritici* derived from teliospores on the varieties Gabo and Langdon from a 1959 rust nursery inoculated with race 15B-1L (Can.). Five of the seven cultures were identified as race 15B-1L (Can.) and two as race 67. The seven cultures are virulent on the varieties Lee and Vernal. This virulence is a characteristic of race 15B that has been observed rarely in uredial cultures derived from barberry plants inoculated by means of teliospores produced in the field.

The infection of barberry plants by means of teliospores that are reasonably certain to be race 15B-1L (Can.) and the isolation of race 15B from aecia are noteworthy because barberry was shown to be resistant to race 15B-1 (Can.).

A SIMPLE METHOD OF PRESERVATION OF THE BARLEY STRIPE MOSAIC VIRUS

W. A. F. Hagborg, Research Station, Canada Department of Agriculture Winnipeg, Manitoba.

The viable preservation of the barley stripe mosaic virus (BSMV) has been considered difficult. McKinney, in 1953, described a long and tedious procedure that was effective for at least 8½ months. It consisted of chemical dehydration and desiccated storage. Last year, in Holland, freeze drying followed by storage *in vacuo* was recommended for the preservation of several other plant viruses.

The present method combined parts of both methods into a simple procedure. Infected leaves were dried thoroughly at a pressure of 250 microns of mercury. The tube was then evacuated or allowed to fill with nitrogen or air at atmospheric pressure before sealing. The dried material, whether stored in air, nitrogen or in a partial vacuum, was quite infective when tested after storage for 5 months. Further tests will be made after longer periods of storage.

It seems probable that with this material freezing is of little or no significance and that any procedure that will quickly arrest enzyme activity, yet permit the reactivation of vital processes after storage, will be efficacious.

ANTIBIOSIS IN BACTERIAL WILT OF ALFALFA

E. J. Hawn and J. B. Lebeau, Research Station, Canada Department of Agriculture, Lethbridge, Alberta.

One or more substances with properties of a polypeptide are produced when dried, pulverized alfalfa roots are soaked in water. It appears to be bacterial in origin and is particularly toxic to *Corynebacterium insidiosum* in vitro. Assays showed a positive relationship between wilt resistance of alfalfa varieties and amount, or activity, of antibiotic produced in their root steeps.

CONTROL OF COVERED SMUT OF OATS BY SEED TREATMENT WITH NON-MERCURIALS

A. W. Henry and R. W. Cromarty, University of Alberta, Edmonton, Alberta

Over a period of years it has been demonstrated in field trials at Edmonton, Alberta that covered smut of oats can be controlled by seed treatment with certain non-mercurial fungicides. Most of these have been applied in dust form at 2 oz. per bushel. The fact that naturally smutted seed was used in the experiment is noteworthy. In certain cases, improved emergence resulted from treatment. Though some of the most promising non-mercurials are not on the market it is possible that less promising ones could be used to advantage until superior ones became available.

THE LONGEVITY OF *FUSARIUM OXYSPORUM* IN SOIL CULTURE

C. D. McKeen and R. N. Wensley, Research Station, Canada Department of Agriculture, Harrow, Ontario.

Fusarium oxysporum f. *melonis,* the muskmelon wilt fungus, survived for 17 years without apparent change in morphology or loss of pathogenicity in tubes of sterilized soil held continually at approximately 3°C in an air-dry condition. Fifteen-year-old cultures yielded 1200 viable propagules per gram of soil; several isolates maintained for 11 years yielded up to 92,000 viable units per gram. The watermelon wilt fungus, *F. oxysporum* f. *niveum,* shows similar capacity to survive. *F. oxysporum* f. *lycopersici,* the tomato wilt pathogen, yielded as many as 95,000 viable propagules per gram of soil after 12 years. Chlamydospores were found to be accountable for survival of the above mentioned fungi.

AMPHISPHAERIA THUJINA (PECK) SACC. CAUSING BLUESTAIN IN BALSAM FIR

Rene Pomerleau and D. E. Ethridge, Forest Biology Laboratory
Canada Department of Forestry, Sillery, Quebec.

Bluestained balsam fir wood (*Abies balsamea* (L.) Mill.) consistently yielded cultures of a non-sporulating fungus which were found to be the same as those obtained from ascospores of *Amphisphaeria thujina* (Peck) Sacc. collected from dead branches of this host. This bluestain appears to be identical with a previously reported but hitherto unidentified stain of conifers. Cultures of *A. thujina* derived both from stained wood and single ascospores were capable of producing typical bluestain in blocks of balsam fir after 2 months. The optimum temperature for growth on malt agar occurred at approximately 28°C. It was considerably reduced at 4°C and 32°C and it had ceased altogether at 35°C, although the inoculum could be revived after 2 weeks at the high temperature.

The results of comparative taxonomic studies with Peck's original collection of *A. thujina* suggest that a possible revision of the species might be necessary.

CHARACTERIZATION OF CLOVER YELLOW MOSAIC VIRUS AND ITS DISTINCTION FROM WHITE CLOVER MOSAIC VIRUS

M. J. Pratt and M. E. Reichmann, Research Station, Canada Department of Agriculture, Vancouver, B.C.

A virus causing considerable reduction in the growth of clover stands in British Columbia was isolated by inoculation from single local lesions on *Gomphrena globosa* leaves. The virus did not react serologically with white clover mosaic virus (WCMV) which it resembles and with which it commonly occurs. Since the virus is found on several clover species, causing a yellow streaking of the leaves, it has been given the name clover yellow mosaic virus (CYMV).

Physical studies on CYMV were hampered by the immediate aggregation of the virus particles on maceration of infected leaves of legume hosts. The problem was overcome by grinding the frozen leaves in ten times their volume of 0.0001 M Versene at pH7. Electron microscopy, electrophoresis and analytical centrifugation confirmed that CYMV is not related to WCMV. Both viruses are flexuous rods; but CYMV has an average particle length of about 530 mu, compared with about 477 mu for WCMV. The electrophoretic mobility of CYMV is -2.8×10^{-5} cm^2/volt/sec in 0.1M potassium phosphate buffer at pH7.5 and a field of 2.7 volts/cm^2, that of WCMV under the same conditions was -5.2×10^{-5} cm^2/volt/sec. The sedimentation coefficient of CYMV was 121 Svedbergs, compared with 112 Svedbergs for WCMV, in 0.1 phosphate at pH7.0.

The two viruses CYMV and WCMV are believed to be the same as pea mottle and pea wilt viruses which have been reported previously as the cause of a mosaic of white clover. The latter viruses are no longer available for direct comparison. To date, CYMV, which resembles pea mottle virus, has been collected only from western North America. WCMV, which resembles pea wilt virus, has been found in England, Germany, New Zealand, The Netherlands and both eastern and western North America.

PRODUCTION OF PERITHECIA OF *VENTURIA INAEQUALIS* ON STERILE APPLE LEAF DISCS

R. G. Ross, Research Station, Canada Department of Agriculture, Kemptville, Nova Scotia.

Perithecia of *Venturia ineaqualis* were produced in vitro on apple-leaf discs which had been sterilized in propylene oxide and then placed on clear agar, PDA, or PDA apple-leaf decoction. The discs were inoculated with a drop of a spore suspension

containing conidia of two sexually compatible strains of *V. inaequalis* and then incubated for two weeks at room temperature and stored at 8°C. Perithecia matured in from four to five months.

Perithecia were also produced when the sterile apple-leaf discs were placed on moist perlite in screw cap vials. Perithecia were developed on leaves collected outdoors at various times of the year and on leaves of various ages from greenhouse seedlings. Newly unfolded leaves from the latter produced few perithecia unless leached before inoculation. Perithecia were produced on apple leaf discs from green leaves of varieties varying in their susceptibility to *V. inaequalis* and on pear-leaf discs of the variety Kieffer. Perithecial production was most abundant at 4°C and none developed at or above 15°C.

INFLUENCE OF SOIL SALINITY ON SEVERITY OF PYTHIUM ROOT ROT OF WHEAT

P. J. Salisbury, Forest Nursery Station, Indian Head, Saskatchewan.

Root rot slowed growth of Thatcher wheat in its 5th week and *Pythium arrhenomanes* was readily isolated from roots when wheat had been grown in crocks on uninoculated, non-saline soil but not when grown on soil of the same lot made saline with chlorides. Amendments of phosphates to soil in the crocks failed to prevent root rot symptoms. This may be related to limited space in the crocks for new roots to grow and to a fairly high soil moisture content.

Saline water agars at various osmotic pressures (OP) were used as substrates for *P. arrhenomanes* and for wheat seedlings. In pure culture, the radial growth of Pythium and the root and coleoptile growth of wheat were less as OP increased. As OP increased root rot of wheat seedlings planted on week-old tube cultures of Pythium was less. A similar relationship between OP and damping-off of a number of dicots and conifers inoculated with *P. ultimum* was observed.

PHYSIOLOGICAL LEAF BLOTCH OF WHEAT

B. J. Sallans and R. D. Tinline, Research Station, Canada Department of Agriculture, Saskatchewan.

A chlorotic leaf blotch has been observed on the durum wheat variety Golden Ball since 1928. No bacterial or fungal agent appeared to be involved in the disease. It could be induced by growing Golden Ball plants in impoverished soil, but did not appear in plants on a highly fertile soil. The disease could be induced in other durum varieties readily but wide differences in susceptibility were evident. Several common wheats appear quite resistant or immune to leaf blotch, but Lake and certain varieties appearing in its pedigree, such as Marquis, Canus, Regent and Kanred developed leaf blotch on impoverished soil. A discussion of the relation of certain nutrients and environmental factors to leaf blotch was given.

RESISTANCE TO CLUBROOT IN CABBAGE AND RELATED CROPS

W. L. Seaman, R. H. Larson and J.C. Walker, University of Wisconsin, Madison, Wisconsin.

The cabbage variety Badger Shipper, developed for clubroot resistance at the University of Wisconsin by J. C. Walker and R. H. Larson, was found to be highly resistant to the predominant race of *Plasmodiophora brassicae* Wor. attacking cabbage in Wisconsin. Plants of this breeding line exhibited a high degree of resistance to a number of isolates of the pathogen from other areas of North America. Marketable heads were produced by plants of Badger Shipper under field conditions which caused severe losses in other commercial cabbage varieties. The appearance in field soils of a race of the pathogen virulent in plants of Badger Shipper was associated with the repeated exposure of plants of the Badger Shipper type in a screening program

for clubroot resistance. The race pathogenic on Badger Shipper appeared to be relatively short-lived in field soil in the absence of a susceptible crop indicating that adequate disease control could be achieved by the use of this variety in a suitable crop rotation. Both the predominant Wisconsin race attacking commercial cabbage varieties and the one virulent in Badger Shipper differed in pathogenicity from those described in Eastern Canada.

EFFECT OF GLIOCLADIUM ON SCLEROTIA OF *CLAVICEPS PURPUREA* (FR.) TUL. AND *SCLEROTINIA SCLEROTIORUM* (LIB.) D. BY. IN SOIL

N. Sharan and A. W. Henry, University of Alberta, Edmonton, Alberta.

A *Gliocladium* sp. from the soil when used to inoculate the sclerotia of *C. purpurea* and *S. sclerotiorum* was found to parasitize them, to prevent them germinating, to produce fruiting bodies of their perfect stages and to cause their degradation. These effects were produced over a period of ten to twelve weeks, during which the inoculated sclerotia were kept under sterile conditions in deep Petri dishes on moist, sterilized, black soil at 15°C.

GRASS VIRUSES AROUND THE WORLD

J. T. Slykhuis, Plant Research Institute, Ottawa, Ontario.

During a survey for virus diseases of cereals and pasture grasses from September, 1960, to February, 1961, aphid vectors and symptoms indicative of barley yellow dwarf were observed on cereals in Japan, India, West Pakistan, Jordan, Egypt and Italy, as well as in Australia and New Zealand where the disease was already recognized. Fine chlorotic streaks and severe leaf chlorosis, characteristic of diseases known to be caused by leaf hopper-transmitted viruses, including wheat striate mosaics in North America and Europe, and Northern wheat mosaic in Japan, were prevalent on wheat on the Nile delta in Egypt. Similar symptoms were observed on wheat in Australia, India, West Pakistan, Iran and Jordan, and on several species of pasture grasses in Australia, New Zealand and India. The seed-borne barley stripe mosaic virus was identified on barley in an introduction nursery in Australia, and in wheat in West Pakistan. Wheat streak mosaic virus was found on wheat in Jordan. Symptoms characteristic of a soil-borne mosaic occurred on oats, and symptoms of Agropyron mosaic were found on *Agropyron repens* (L.) Veauv., *Alopecurus pratensis* L. and *Arrhenatherum avenaceum* Beauv. in New Zealand.

PARASEXUAL RECOMBINATION IN *COCHLIOBOLUS SATIVUS*

R. D. Tinline, Research Station, Canada Department of Agriculture, Saskatoon, Saskatchewan.

Multiple marked strains of *C. sativus* were used to synthesize heterokaryons. The markers comprised color, anisomycin resistant and nutritionally exacting mutations. Heterozygous diploid cultures were obtained from two of the heterokaryons. Dominance relationships of the markers and their alleles were expressed in heterokaryons and diploids. Segregants were isolated from one diploid strain by various techniques. Frequently, the phenotypes of the segregants showed that the markers had recombined. Many of the segregants were hemizygous and further segregation from such strains was detected. Some implications of the parasexual cycle in the variation of *C. sativus* are discussed.

THE PRESENT STATUS OF DISEASES OF OILSEED RAPE IN SASKATCHEWAN

T. C. Vanterpool, University of Saskatchewan, Saskatoon, Saskatchewan.

There are two species of oilseed rape grown in Saskatchewan: *Brassica napus* L., known as the Argentine type, and *B. campestris* L., known as the Polish type. No outstanding differences in susceptibility of the two types to any particular disease have yet been observed.

The following facts are of special significance in the disease situation: (1) the Polish type matures about 3 weeks earlier than the Argentine; (2) the acreage grown is 3 to 4 times greater in the humid parkbelt to the northeast than on the open dry land prairie to the southwest; and, (3) there are many areas of concentration in which the crop is grown. The total loss from diseases has been slight, but in some areas and on individual farms in years favourable to specific diseases the losses have been of economic importance, especially in the parkbelt. Those which fall in this latter category are *Sclerotinia* stem rot, the white rust downy mildew complex *(Albugo-Perosnospora)*, the *Alternaria* gray and black leaf spots and seedling blights, and *Mycosphaerella* black blight, with which *Phoma* blackleg has recently been found associated. Some others which are present, but which have not been serious as yet, are: yellows caused by the aster yellows virus, *Fusarium* root rot, *Xanthomonas* black rot powdery mildew and undetermined deficiency and virus troubles. Under Saskatchewan conditions sound crop culture practices have been effective in keeping rape diseases to a minimum. The growers who transgress these practices are the ones who suffer losses, even in years when the diseases are not otherwise general.

SOME COMMENTS ON THE RHIZOCTONIA PROBLEM IN RELATION TO CEREALS

T. C. Vanterpool and M. J. Kuo, University of Saskatchewan, Saskatoon, Saskatchewan.

Both *Pellicularia filamentosa* (Pat.) Rogers *(Rhizoctonia solani)* and *P. praticola* (Kotila) Flentje *(R. praticola)* are common inhabitants of Saskatchewan soils. *P. praticola* is the major cause of seedling blight of flax which frequently causes severe thinning of the stands, especially on the summer-fallow crop.

P. filamentosa is considered of negligible importance as a causual agent of this disease on flax. Both species are occasionally isolated from the basal parts of barley, oat and wheat stems, and in artificial inoculation experiments both have been found to cause typical sharp-eyespot symptoms. Previous reports attribute the disease on cereals solely to *P. filamentosa*, but *P. praticola* must now be considered as a causual agent also. Sharp-eyespot of cereals has not been found in the field in this province. Isolations from suspected sharp-eyespot lesions on the coleoptiles of cereals have invariably yielded *Bipolaris sorokiniana* (Sacc. ex Sorok.) Shoemaker. Sharp-eyespot of cereals, therefore, appears to be of very minor importance. However, *Rhizoctonia* seedling blight of flax in the fallow crop has been observed to be equally severe whether or not the crop preceeding the fallow year was a cereal or flax. This indicates that the cereals are nevertheless effective carriers of *P. praticola.*

HYDROGEN CYANIDE PRODUCTION BY CERTAIN SNOW MOLD FUNGI

E. W. B. Ward, Plant Pathology Laboratory, Canada Department of Agriculture, Edmonton, Alberta.

J. B. Lebeau, Research Station, Canada Department of Agriculture, Lethbridge, Alberta.

It has been known for a number of years that winter crown rot of legumes and snow mold of grasses in Western Canada are caused, primarily, by an unidentified basidiomycete. Cultures of the fungus were shown to produce HCN, and this appeared to be associated with active growth on rich natural media. Hydrogen cyanide production was also demonstrated during infection of the host plant where it is considered to be a major factor in disease development.

Recent investigations, however, have shown that only certain isolates (type B) of the unidentified basidiomycete produce HCN in culture although all pathogenic isolates (types A and B) produce HCN in the host plant. Reinvestigation of HCN production by type B isolates in culture, using the shake culture method and both natural and synthetic media, indicates that it is an autolytic process and does not require complex natural media. Some evidence has been obtained which suggests that a

cyanogen is formed in type B cultures but not in type A cultures. Release of HCN by type A isolates during infection may be presumed, therefore, to depend on the provision of a suitable cyanide precursor by a susceptible host. It is possible that certain differences may exist in the mode of pathogenesis exhibited by the two types of isolates.

THE APPLICABILITY OF A SOIL-DILUTION-PLATE-COUNT TECHNIQUE IN ESTIMATING SOIL POPULATIONS OF *FUSARIUM OXYSPORUM* f. *MELONIS*

R. N. Wensley and C. D. McKeen, Research Station, Canada Department of Agriculture, Harrow, Ontario.

The applicability of a soil-dilution-plate-count method for determining soil populations of *F. oxysporum* f. *melonis* was investigated as a prerequisite to resolving certain apparent anomalies in the wilt inducing potentials of naturally infested field soils. Having been found satisfactory, the method was applied to soils from two fields which were planted repeatedly to melons and in which the incidence of wilt differed consistently. Quantitatively, isolates of the fungus, identified as *F. oxysporum* and tentatively regarded as pathogenic to muskmelon, were found to be in inverse ratio to the disease inducing potentials of the two soils. Because of the morphological and cultural identity of isolates, estimates as to the disease inducing capacity of components of the species can only be resolved on the basis of pathogenicity trials.

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